AMENDMENT TO THE CLAIMS

1. (currently amended) A method for estimating a propensity of a vehicle to rollover, the method comprising the steps of:

determining lateral kinetic energy of said vehicle in response to vehicle longitudinal velocity and vehicle side slip angle;

measuring a lateral acceleration of said vehicle; ~~and~~

calculating a minimum potential energy of said vehicle require for rollover; and

determining a rollover potentiality index in response to said lateral kinetic energy, said minimum potential energy, and said lateral acceleration.

2. (original) A method for detecting a rollover event of a vehicle, the method comprising the steps of:

determining lateral kinetic energy of said vehicle in response to vehicle longitudinal velocity and vehicle side slip angle;

measuring a lateral acceleration of said vehicle;

determining a rollover potentiality index in response to said lateral kinetic energy and said lateral acceleration;

determining a rollover index by weighting said rollover potentiality index by a factor of said lateral acceleration; and

determining if said rollover index is above a predetermined threshold.

3. (original) The method of claim 2, wherein said vehicle longitudinal velocity is determined by monitoring wheel speed sensors.

4. (original) The method of claim 2 wherein said vehicle side slip angle is determined by monitoring a yaw rate of said vehicle, a lateral acceleration of said vehicle, a steering wheel angle of said vehicle, and a vehicle dynamic model.

5. (original) The method of claim 2 wherein said lateral acceleration is determined by monitoring an accelerometer.

6. (original) The method of claim 2 wherein said rollover event comprises a condition wherein a corrective action is taken to counteract an actual rollover.

7. (original) The method of claim 2 further comprising a control action for changing at least one operating parameter of said vehicle in response to detecting said rollover event to counteract an actual rollover from occurring.

8. (original) The method of claim 7 wherein said control action comprises a torque reduction applied to at least one wheel of said vehicle in response to said control action.

9. (original) The method of claim 8 wherein said torque reduction comprises an actuation of a brake.

10. (previously presented) The method of claim 7 wherein said control action comprises a torque reduction change in said engine output.

11. (original) The method of claim 7 wherein said control action comprises an automated steering adjustment.

12. (original) The method of claim 7 wherein said control action comprises an automated suspension adjustment.

13. (canceled)

14. (previously presented) The method of claim 25 wherein said rollover index is represented by the formula:
$\Phi = (\Phi_0)\,(|a_{ym}| - (d/h)(g)\,0.8 > 0)$.

15. (original) A system for estimating a propensity of a vehicle to rollover, the system comprising:

at least one wheel sensor for measuring the vehicle longitudinal velocity;

a yaw rate sensor;

a lateral acceleration sensor;

a steering wheel sensor;

a vehicle specific dynamic model; and

a controller for determining a side slip angle and for determining a rollover potentiality index in response to weighting said rollover potentiality index by a factor of a measured lateral acceleration for determining a rollover index.

16. (original) The system of claim 15 wherein said lateral acceleration sensor comprises an accelerometer.

17. (original) The system of claim 15 further comprising a control action for changing at least one operating parameter of said vehicle in response to detecting said rollover event to prevent an actual rollover from occurring.

18. (original) The system of claim 17 wherein said at least one operating parameter comprises a torque reduction of said engine output.

19. (original) The system of claim 17 wherein said at least one operating parameter comprises a torque reduction of at least one wheel.

20. (original) The system of claim 19 wherein said torque reduction comprises an actuation of a brake.

21. (original) The system of claim 17 further comprising an automated steering adjustment system for adjusting said at least one operating parameter.

22. (original) The system of claim 17 further comprising an automated suspension adjustment system for adjusting said at least one operating parameter.

23. (canceled)

24. (previously presented) The system of claim 26 wherein said rollover index is represented by the formula:

$\Phi = (\Phi_0)\,(\,|\,a_{ym}\,| - (d/h)\,g\,0.8 > 0)$.

25. (previously presented) A method for detecting a rollover event of a vehicle, the method comprising the steps of:

determining lateral kinetic energy of said vehicle in response to vehicle longitudinal velocity and vehicle side slip angle;

measuring a lateral acceleration of said vehicle;

determining a rollover potentiality index in response to said lateral kinetic energy and said lateral acceleration;

determining a rollover index by weighting said rollover potentiality index by a factor of said lateral acceleration; and

determining if said rollover index is above a predetermined threshold;

wherein said rollover potentiality index is represented by the formula:

$$\Phi_o = \frac{1}{2}|V_x \beta|^2 - \sqrt{g^2 + a_{ym}^2}\sqrt{d^2 + h^2} + d a_{ym} + h g ,$$

where V_x is said vehicle longitudinal velocity, β is said vehicle side slip angle, g is a gravity constant, a_{ym} is said measured lateral acceleration, d is one half a vehicle track width, and h is a nominal center of gravity height.

26. (previously presented) A system for estimating a propensity of a vehicle to rollover, the system comprising:

at least one wheel sensor for measuring the vehicle longitudinal velocity;

a yaw rate sensor;

a lateral acceleration sensor;

a steering wheel sensor;

a vehicle specific dynamic model; and

a controller for determining a side slip angle and for determining a rollover potentiality index in response to weighting said rollover potentiality index by a factor of a measured lateral acceleration for determining a rollover index;

wherein said rollover potentiality index is represented by the formula:

$$\Phi_o = \frac{1}{2}|V_x \beta|^2 - \sqrt{g^2 + a_{ym}^2}\sqrt{d^2 + h^2} + d a_{ym} + h g ,$$

where V_x is said vehicle longitudinal velocity, β is said vehicle side slip angle, g is a gravity constant, a_{ym} is said measured lateral acceleration, where d is one half a vehicle track width, and h is a nominal center of gravity height.

27. (new) A method for estimating a propensity of a vehicle to rollover, the method comprising the steps of:

calculating a lateral kinetic energy of the vehicle;

calculating a minimum potential energy of the vehicle required for rollover, said minimum potential energy calculation determined using sensed dynamic characteristics of the vehicle not including a vehicle roll angle sensor signal or a vehicle roll rate sensor signal; and

determining a rollover potentiality index in response to said calculated lateral kinetic energy and said calculated minimum potential energy.

28. (new) The method of claim 27 further comprising the step of implementing a control action to reduce said propensity of said vehicle to rollover in the event said rollover potentiality index is greater than a predetermined threshold.

29. (new) The method of claim 28 including the step of measuring a lateral acceleration of said vehicle, wherein said control action is only implemented if said measured lateral acceleration is greater than a predetermined amount which is a function of a critical lateral acceleration indicative of a vehicle rollover event.

30. (new) The method of claim 27 wherein said lateral kinetic energy is calculated using a vehicle longitudinal velocity characteristic and a vehicle side slip characteristic.

31. (new) A method for estimating a propensity of a vehicle to rollover, the method comprising the steps of:

providing a plurality of sensors for generating sensor signals representing dynamic characteristics of said vehicle including a lateral acceleration sensor but not including a vehicle roll angle sensor or a vehicle roll rate sensor;

calculating a lateral kinetic energy of said vehicle using said sensor signals;

calculating a minimum potential energy of said vehicle required for rollover using said sensor signals;

determining a rollover potentiality index in response to said calculated lateral kinetic energy, said calculated minimum potential energy and a lateral acceleration signal; and

implementing a control action to reduce said propensity of said vehicle to rollover in the event said rollover potentiality index is greater than a predetermined threshold.

32. (new) A method for estimating a propensity of a vehicle to rollover, the method comprising the steps of:

calculating a lateral kinetic energy of said vehicle;

measuring a lateral acceleration of said vehicle;

calculating a minimum potential energy of said vehicle required for rollover;

determining a rollover potentiality index in response to said calculated lateral kinetic energy and said calculated minimum potential energy;

determining if said measured lateral acceleration is more than a predetermined percentage of a statically critical lateral acceleration; and

determining whether said vehicle has a propensity to rollover in response to said rollover potentiality index and said determination of said measured lateral acceleration being more than said predetermined percentage of said statically critical lateral acceleration.